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UNITED STATES DISTRICT COURT

DISTRICT OF HAWAII

LUIS SANCHO, WALTER L. WAGNER,	Civil No. 08-00136-HG-KSC
Plaintiffs,	**FEDERAL DEFENDANTS' DECLARATION OF BRUCE P. STRAUSS**
v.	
UNITED STATES DEPARTMENT OF ENERGY, *et al.*,	
Defendants.	

I, Bruce P. Strauss, hereby declare as follows:

1. I am a Program Manager in the Office of High Energy Physics, Office of Science, U.S. Department of Energy ("DOE"). I have served in this position since April 1997. My principal responsibilities include serving as Associate Program Manager for the Large Hadron Collider ("LHC") Accelerator Construction Project and Program Manager for University, Industrial and Intergovernmental Grants. In addition, I have served as the Executive Secretary of the High Energy Physics Advisory Panel, and frequently, I serve as a senior member of management and technical review panels both in the United States and overseas. In such capacity I have knowledge of the U.S. participation in the LHC project.

2. I have been associated with the construction of particle accelerators since 1968, first at DOE's Argonne National Laboratory, and then at DOE's Fermi National Accelerator Laboratory ("Fermilab"), where I was the Assistant Division Director of the Tevatron collider. From 1978 to 1997, I worked in the private industrial sector in the business of designing, constructing and supplying superconducting magnets, and as a technical and management consultant to private firms and the government. I was trained at the Massachusetts Institute of Technology, where I received the B.S. degree in 1964 and the Sc.D (Ph.D) in 1967. I received an M.B.A. from the University of Chicago in 1972, and a Certificate in

Financial Planning from Boston University in 1984. I have attached my Curriculum Vitae and list of publications at the end of this declaration. See Attachs. 1 and 2.

3. DOE's Office of High Energy Physics—along with the National Science Foundation ("NSF"), Division of Physics—is part of the Joint Oversight Group ("JOG") for the United States' participation in the LHC project at CERN, near Geneva, Switzerland.[1] In my capacity as a Program Manager with DOE's Office of High Energy Physics, I have been assigned as Associate Program Manager for LHC Construction for DOE's participation in the LHC project.

4. Through my responsibilities as Associate Program Manager for the LHC Construction project at DOE, I have become familiar with the matters in this declaration and can and would testify competently to them if called as a witness.

CERN and the Large Hadron Collider

5. The European Organization for Nuclear Research ("CERN") is an intergovernmental organization headquartered in Geneva, Switzerland. CERN was established by convention in 1954. All of CERN's 20 member states are European countries.

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[1] The U.S. contribution to the LHC program is managed jointly by DOE and NSF under the terms of an inter-agency Memorandum of Understanding ("MOU") signed on December 13, 1999. A DOE/NSF Joint Oversight Group provides oversight through the U.S. LHC program office. See "MOU between DOE and NSF concerning U.S. participation in the LHC" (attached hereto as Attachment 3) at 8-10.

6. The LHC is the product of more than a decade of planning and collaboration headed by CERN. The LHC is a particle accelerator straddling the French-Swiss border that is comprised of a 27 km (approximately 17-mile) ring of superconducting magnets and particle accelerating structures located 100 meters (approximately 330 feet) underground.

7. In particle accelerators, or colliders, part of the energy of the colliding particles is directly transformed into other forms of matter. Any increase in energy opens an opportunity to create, for a brief moment, new types of particles. The LHC is designed to accelerate proton particles to nearly the speed of light and collide them at the center of four large detectors designed to passively observe these collisions. CERN's LHC will result in a seven-fold increase in energy compared to the Tevatron collider currently operating at DOE's Fermilab in Illinois, which is presently the highest-energy collider in the world. This increase in energy, together with the possibility of observing previously unseen phenomena, is expected to further our understanding of the fundamental nature of the universe. Observations of these new particles will help physicists explore questions like the origin of mass, unification of the fundamental forces, and the evolution of the universe, among others.

DOE Relationship with CERN

8. On December 8, 1997, the United States—acting through the Secretary of Energy and the Director of NSF—entered into an International Co-operation Agreement with CERN. The International Co-operation Agreement sets forth the terms of U.S. participation in the LHC. See generally Attach. 4.

9. U.S. participation in the LHC is the result of many years of work by U.S. physicists at national laboratories and universities, the endorsement of national advisory panels, support of DOE and NSF program offices, and recurring Congressional appropriations since 1996. In 2006, the U.S. National Academy of Sciences published a report on elementary particle physics, written by a distinguished committee with membership drawn from diverse disciplines, which had one chief recommendation: "The United States should remain globally competitive in elementary particle physics by playing a leading role in the worldwide effort to aggressively study Terascale physics." Comm. on Elementary Particle Physics in the 21st Century, National Research Council, *Revealing the Hidden Nature of Space and Time: Charting the Course for Elementary Particle Physics*, 3 (2006) (attached hereto as Attachment 5). The committee recommended that the United States should work to achieve the following high priority objective: "Fully exploit the opportunities afforded by the construction of the Large Hadron Collider (LHC) at the European Center for Nuclear Research (CERN)" Id.

10. Participation in the international collaboration at the LHC is fully aligned with DOE's strategic plan, which states as one of its goals to "Advance fundamental knowledge in high energy physics and nuclear physics that will result in a deeper understanding of matter, energy, space, and time." See DOE 2006 Strategic Plan at 18 (attached hereto as Attachment 6).

11. Officials and employees of DOE's Office of High Energy Physics regularly attend CERN proceedings as observers for the United States. As part of my official responsibilities, I am routinely informed of the content of those proceedings. In addition, I interact with CERN scientists and managers on a regular basis as part of ongoing staff-level interactions to address questions or issues that arise regarding DOE-supported scientists' role in the LHC.

12. Under the International Co-Operation Agreement, the United States has been accorded "observer" status in CERN's governing council ("Council"). See Attach. 4 at 5 (§ 7.1). As an observer to CERN's Council, the United States has no decision-making authority in CERN, but is permitted to attend Council meetings and to receive Council documents. The United States has no role in making financial, policy, or management decisions at CERN. See id. at 3 § 1.9; see also http://public.web.cern.ch/Public/en/About/Global-en.html (last visited June 16, 2008) (attached hereto as Attachment 7).

13. Neither the United States, nor DOE, nor NSF has authority to decide whether the LHC operates or not. See Attach. 4 at 6 (§ 10.4) (making CERN solely responsible for the LHC accelerator's operation and maintenance, once accelerator is completed and commissioned). Only CERN Member States, through the CERN Council and CERN Director-General, have that authority, as well as exclusive responsibility for those decisions. See id. at 3 (§ 1.8); see also Attach. 7.

DOE's Support for Construction of Some Parts of the Collider

14. The International Co-Operation Agreement provided for DOE's involvement in: (1) construction of some components of the LHC; and (2) participation by some U.S. researchers in experiments that will be conducted at the LHC. The total amount of U.S. contributions to the construction of the LHC accelerator and two of the LHC detectors, over a period of approximately ten years, would consist of a maximum of $531M, with DOE providing $450M. The International Co-operation Agreement further provided that DOE's $450M contribution would consist of $200M for construction of the accelerator, and $250M for construction of two of the four detectors. See Attach. 4 at 5 (§§ 8.1, 8.2). The two detectors that DOE helped to build are known as ATLAS (A Toroidal LHC Apparatus) and CMS (Compact Muon Solenoid).

15. In 1996, DOE began funding conceptual and design work on the LHC accelerator and detectors.

16. After the Secretary of Energy signed the International Co-operation Agreement in December 1997, DOE and the NSF executed the U.S. Large Hadron Collider Construction Project Execution Plan ("PEP") (Revision 0, dated December 1, 1998) (attached hereto as Attachment 8).[2] The PEP describes the following information related to the U.S. support for construction of the LHC: mission need and justification; scope, goals and risks; management structure; management systems; and environment, safety, and health requirements. The PEP serves three basic functions. First, it describes the project management and execution processes for the U.S. LHC Construction Project. As approved by the JOG, the PEP constitutes the authorizing document for the method of project execution and therefore has precedence. Second, the PEP establishes the project baselines (technical, cost, and schedule) against which project execution will be measured. Changes to project execution will be evaluated in terms of baseline impacts, and approved by appropriate levels of management as described in this document. Third, the PEP serves as the primary reference document for all levels of the project team.

17. The PEP states that CERN "has undertaken construction of a new high energy physics research facility, the Large Hadron Collider (LHC) at its laboratory site outside Geneva, Switzerland . . . . In addition to its responsibility for

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[2] A revised version of the PEP was issued in October 2002.

construction of the LHC accelerator, CERN is contributing to the construction of, and is providing coordination and administrative support for, the ATLAS and CMS detectors." Attach. 8 at 1.

18. On the basis of the PEP, DOE began funding the construction of the accelerator and the detectors in 1998. From 1998 through 2005, DOE spent the $200M for construction of the accelerator that it had agreed to spend in § 8.1 of the International Co-Operation Agreement. From 1998 through 2007, DOE spent the $250M on construction of the detectors that it had agreed to spend in § 8.2 of the International Co-Operation Agreement. See "U.S. LHC Accelerator and Detectors Funding Profile," in DOE FY 2009 Congressional Budget Request (February 2008) at 245 (attached hereto as Attachment 9). DOE has publicly reported to Congress its expenditures on the LHC every year that DOE has worked on the LHC project.

19. In making these expenditures, DOE provided funding to several of its national laboratories – Fermilab, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, and Argonne National Laboratory – for construction, pre-installation testing, and delivery of LHC accelerator components, and for assistance to CERN with detector installation and verification testing. DOE provided its funding through modifications to its contracts for management and operation of the DOE national laboratories. Modification of the Statements of

Work for the national laboratories was not necessary, because construction of the LHC accelerator and detector components fell within the scope of their existing authorized activities.

20. For the LHC accelerator, DOE provided support for construction of 38 of more than 1,890 required superconducting magnets, or about 2%. Superconducting magnets are able to generate very large magnetic fields that are used to steer the particle beams around the LHC ring and to focus them inside the detectors. Separately, the DOE also helped build two of the four detectors (ATLAS and CMS).

21. Table 1 summarizes DOE contributions to the construction of the LHC.

Table 1: DOE contributions to construction of LHC accelerator and to the two detectors.

As of March 26, 2008, 1 Swiss Franc = 1 USD.

Instrument	Total Cost (in Billion Swiss Francs, excluding labor costs)	DOE Contribution (in Billion US$, including labor)	Fraction of DOE contribution completed
LHC accelerator	4.8	0.200	100%
ATLAS	0.54	0.103	100%

CMS	0.50	0.147	100%
Total	5.84	0.450	100%

See "LHC: The Guide," CERN-2008-001-Eng (March 4, 2008) (attached hereto as Attachment 10); U.S. LHC Construction Project Execution Plan (October 29, 2002), Appendix 2.B (U.S. ATLAS) and Appendix 2.C (U.S. CMS) (excerpted) (attached hereto as Attachment 11).

22. As shown in Table 1, all DOE contributions toward construction of the LHC have now been completely disbursed. The DOE accelerator contributions were 100% disbursed, and the DOE accelerator components were physically delivered to CERN in Geneva, Switzerland, by March 7, 2007. In addition, DOE completed transfer of title of all DOE accelerator components to CERN on September 18, 2007. DOE detector contributions were 100% disbursed as of June 2007; the only remaining step is to formally close out the accounting on this part of the project, which is a purely ministerial task. Despite the differences between U.S. and European accounting practices, the DOE contributions to the construction of the LHC accelerator and the detectors are about 8% of the total cost. Including labor costs, DOE's contributions to the construction of the LHC accelerator and the detectors are about 4% of the total cost of the LHC.

23. Plaintiffs in their scheduling conference statement of June 12, 2008 (Doc. No. 9) allege that in addition to the 38 magnets referenced, the United States has constructed most of the superconducting magnets for the LHC via its contracting through Fermilab, and that this work is "not completed" in that the United States and Fermilab continue to consult with LHC staff about the magnets, and maintain the magnets in operating condition. Plaintiffs' allegations are incorrect. Apart from those 38 magnets, CERN contracted with four European industry groups to construct the remainder of the 1,890 large superconducting magnets in the LHC ring. The dipole magnet cold masses were made in France by a group headed by Alstom, in Italy by Ansaldo Superconduttori Genova (ASG) and in Germany by Babcock-Noell. The quadrupole magnet cold masses were made in Germany by ACCEL Instruments GmbH. These were done under CERN contracts with CERN funds. The cold masses were placed into cryostats in a factory established on the CERN site. No U.S. entity provided funds or day to day management of the procurement or construction of these devices. To maintain DOE's domestic competency in accelerator technology, a few Fermilab staff members have been at CERN over the past few years. Part of their assignment was the supervision of the installation of the U.S. components, to which the United States has now transferred title.

DOE's Support for Research Experiments Involving the Detectors

24. Together with NSF, DOE plans to provide financial assistance to physicists from U.S. universities and DOE and NSF laboratories in collaborative physics research to be conducted at the ATLAS and CMS detectors with other scientists from around the globe.

25. Table 2 summarizes the DOE contributions toward the scientific workforce that will be involved in experiments involving ATLAS and CMS.

Table 2: DOE-supported scientists participating in the two largest LHC experiments (as of 3/26/2008).

Experiment	Number of DOE-supported scientists	Total number of scientists (U.S.+ other countries)	DOE Fraction
ATLAS	350	2095	16.7%
CMS	498	1835	27.1%
Total	848	3930	21.6%

These figures are based upon information that DOE's Office of High Energy Physics received on March 26, 2008, from DOE's Fermi National Accelerator Laboratory and Brookhaven National Laboratory.

26. CERN's obligations for accelerator operation are defined in a CERN document, "General Conditions Applicable To Experiments At CERN" (February 20, 2008) (attached hereto as Attachment 12), which states: "CERN normally

provides, free of charge and within the limits and constraints imposed by the available resources and schedules of accelerators, the following standard services and facilities for the duration of the Experiment: . . . a) particle beams and related shielding . . . ; b) beam time allocation and scheduling . . . ." Attach. 12 at 5. This policy is in accordance with present and past U.S. practices and is consistent with long-standing guidelines of the International Committee on Future Accelerators, which was created in 1976 by the International Union of Pure and Applied Physics to facilitate international collaboration in the construction and use of accelerators for high energy physics. In other words, while the U.S. and other international and non-federally-financed researchers will conduct experiments, CERN will be solely responsible for providing, controlling, and scheduling the use of the particle beams necessary for collisions to occur.

27. If U.S. scientists were to be pulled back from the LHC today, this would have no impact on CERN's start of LHC operations. The LHC would still operate without U.S. participation. The DOE Office of High Energy Physics estimates that the cost impacts to the U.S. of halting U.S. DOE-funded operations at CERN would be about US$10,000,000 per month of inactivity. This estimate is based on the fact that DOE has made contractual commitments with U.S. research organizations that must be fulfilled, and that no scientific work product would be delivered by U.S. researchers during that period of inactivity. The opportunity

costs are even larger. There is a very good possibility that important scientific discoveries will be made at the LHC during very early LHC operations. If U.S. physicists were enjoined from participating in experiments during that period, the U.S. would miss the early scientific benefits from its $531M investment in the LHC.

The Safety of the LHC

28. The Plaintiffs in this case have expressed safety concerns regarding certain speculations on new phenomena that might be discovered at the LHC. Similar concerns were raised before the start of operations of the Relativistic Heavy Ion Collider ("RHIC") at DOE's Brookhaven National Laboratory ("BNL"), in Upton, New York, in 1999. Reports specifically addressing safety concerns at each of these facilities were prepared at the time.

29. In 1999, the then-director of BNL, Dr. John H. Marburger, III, now Science Advisor to the President of the United States, commissioned a prominent group of U.S. physicists (including one who is now a Nobel Laureate) to review the safety issue at RHIC from a scientific standpoint. The report concluded: "Our conclusion is that the candidate mechanisms for catastrophe scenarios at RHIC are firmly excluded by existing empirical evidence, compelling theoretical arguments, or both." W. Busza *et al.*, "Review of Speculative 'Disaster Scenarios' at RHIC"

(September 28, 1999) ("1999 RHIC Safety Report") (attached hereto as Attachment 13) at 1, 2.

30. In 2002, CERN commissioned an LHC Safety Study Group to carry out a similar study for the LHC. The group was composed of six European theoretical physicists not affiliated with CERN. That report concluded:

> We review the possibility of producing dangerous objects during heavy-ion collisions at the Large Hadron Collider. We consider all such objects that have been theoretically envisaged, such as negatively charged strangelets, gravitational black holes, and magnetic monopoles. We find no basis for any conceivable threat.

J.-P. Blaizot *et al.*, "Study of Potentially Dangerous Events During Heavy-Ion Collisions at the LHC: Report of the LHC Safety Study Group" (February 28, 2003) ("2003 LHC Safety Report") (attached hereto as Attachment 14) at iii.

31. Recently, CERN commissioned a group of physicists to re-examine the issue of safety in particle collisions at the LHC. On June 20, 2008, CERN's LHC Safety Assessment Group ("LSAG") released a report entitled "Review of the Safety of LHC Collisions." The report confirms the findings and conclusions of the earlier reports and, by incorporating recent developments in theoretical and experimental physics, further strengthens these conclusions. The 2008 LSAG report concludes:

> Having reviewed the theoretical and experimental developments since the previous safety report was

> published, we confirm its findings. There is no basis for any concerns about the consequences of new particles or forms of matter that could possibly be produced by the LHC.

J. Ellis *et al.*, "Review of the Safety of LHC Collisions" (June 20, 2008) ("2008 LSAG Report") (attached hereto as Attachment 15) at 14.

32. The 2008 LSAG Report was reviewed by the Scientific Policy Committee ("SPC"), an external scientific advisory group that reports to the CERN Council. The SPC, which is composed of many renowned physicists not affiliated with CERN, appointed a five-member panel of the SPC to review in detail the LSAG Report and other associated documents addressing LHC safety. The SPC panel, including one Nobel Laureate, reaches the following conclusion in its report to the CERN Council:

> To summarize, we fully endorse the conclusions of the LSAG report: there is no basis for any concerns about the consequences of new particles or forms of matter that could possibly be produced at the LHC.

CERN Scientific Policy Committee, "SPC Report On LSAG Documents" (June 20, 2008) ("SPC Report") (attached hereto as Attachment 16) at 4. As reported by CERN in its press release of June 20, 2008, the SPC panel presented its conclusion to a meeting of the full 20 members of the SPC, who unanimously approved it. See http://press.web.cern.ch/press/PressReleases/Releases2008/ PR05.08E.html (last visited June 20, 2008) (attached hereto as Attachment 17).

33. The 1999 RHIC Safety Report pointed out that naturally-occurring cosmic rays of extremely high energy have been colliding throughout the history of the universe. Attach. 13 at 3. The authors went on to observe that "proton-proton collisions with a center of mass exceeding 100,000,000 TeV [approximately seven million times more powerful than the LHC] have occurred so frequently in our past light cone that even such astonishingly high energy collisions can be considered safe." Id. Therefore, after bombarding the Earth and the Moon for about five billion years, Nature's own accelerator, much more powerful than any man-made accelerator, has proven the original safety concerns to be unfounded. The 2008 LSAG Report also examines cosmic-ray collisions. Comparing the experimentally measured rate of very high energy cosmic rays with the rate of collisions at the LHC, the report notes that "Nature has already conducted the equivalent of about a hundred thousand LHC experimental programmes on Earth already – and the planet still exists." Attach. 15 at 4. The 2008 LSAG Report also states:

> Moreover, each second, the Universe is continuing to repeat about [30 million million] complete LHC experiments. There is no indication that any of these previous "LHC experiments" has ever had any large-scale consequences. The stars in our galaxy and others still exist, and conventional astrophysics can explain all the astrophysical black holes detected.

Id.

34. The plaintiffs in this lawsuit raise three main types of hypothetical occurrences that they claim pose a safety risk at the LHC: strangelets, black holes, and monopoles. The arguments presented by the Plaintiffs regarding these purely hypothetical occurrences are neither accepted by the scientific community, nor have they been published in scholarly peer-reviewed journals. It is the conclusion of DOE's Office of High Energy Physics that, based upon the analysis of the aforementioned safety reviews, current claims of a catastrophe occurring due to LHC operations are not based on rigorous scientific analysis and are unfounded.

Strangelets

35. Strangelets are hypothetical forms of matter whose existence has never been proven. Unlike most matter that we come in contact with on a daily basis that is made of 'up' and 'down' quarks, the hypothetical strangelets would also be composed of 'strange' quarks, a heavier and unstable cousin of the up and down quarks. The 1999 RHIC Safety Report affirmed that there is a "lack of a plausible mechanism whereby hypothetical dangerous strangelets might be produced." Attach. 13 at 14. In addition, even if strangelets were to exist, they would be hypothetically more easily produced at lower energy colliders than RHIC. The concerns about the production of "catastrophic" strangelets at RHIC were thus shown to be unfounded by the 1999 RHIC Safety Report.

36. In order to assess the hypothetical risk associated with producing strangelets at the LHC, the 2003 LHC Safety Report used cosmic ray and astrophysical measurements to show that, except when making "totally unrealistic" assumptions, the data excluded the possibility of creating the "dangerous" strangelets at the LHC. Attach. 14 at 4. The authors also looked at data from previous experiments and from the currently running RHIC collider. When taken together with theoretical models of strangelet production, the authors concluded that "the LHC will not be more efficient in producing strangelets than RHIC." Id. at 2. Since RHIC has been operating safely since 2000, the concerns that the hypothetical strangelets will cause a catastrophic event at the LHC are unfounded.

37. The 2008 LSAG Report examines again the hypothetical risk of producing the never-observed strangelets in light of more recent experimental results from RHIC. The report states that the conclusions from the previous safety reports are further strengthened by recent RHIC measurements and an improved understanding of the theoretical models that explain these measurements. On the hypothetical danger of strangelet production at the LHC, the 2008 LSAG Report concludes:

> We conclude on general physical grounds that heavy-ion collisions at the LHC are less likely to produce strangelets than the lower-energy heavy-ion collisions already carried out in recent years at RHIC, just as strangelet production at RHIC was less likely than in

> previous lower-energy experiments carried out in the 1980s and 1990s.

Attach. 15 at 12.

Black Holes

38. Black holes are formed in the Universe when massive stars collapse under their own gravitational pull. Their gravitational energy is so large that they pull in and accrete surrounding matter. Some have speculated that microscopic black holes could be produced at RHIC or at the LHC. While certain theoretical models allow this possibility, these models also show that hypothetical micro black holes, if produced, would have so little mass and energy that they would not be able to pull in surrounding matter. The 1999 RHIC Safety Report observed that because gravitational forces are so much weaker than nuclear forces, a hypothetical micro black hole would not accrete any surrounding nuclear matter. At these scales, the effective nuclear force is at least 10^{22} (ten billion trillion times) stronger than the gravitational pull of a micro black hole. Attach. 13 at 2.

39. The 2003 LHC Safety Report reiterated the results of the previous RHIC study on classic black hole production. The 2003 LHC Safety Report concluded that "it is clear that classical gravitational effects are completely negligible for LHC energies and luminosities in the conventional theory of gravity." Attach. 14 at 10.

40. In addition, the 2003 LHC Safety Report also looked at less conventional theories with large new space dimensions. There is no evidence that these unconventional theories are correct. However, the authors found that even for these theories there was no known accelerator (including the LHC) that could produce a black hole massive enough to be "dangerous." Id. at 11-12. On black hole production, the LHC report concluded that "black hole production does not present a conceivable risk at the LHC due to the rapid decay of the black hole through thermal processes." Id. at 12.

41. The 2008 LSAG Report confirms and further strengthens the conclusions of the previous safety reports regarding the hypothetical production of dangerous microscopic black holes. The 2008 LSAG Report states that even if hypothetical mini black holes were produced at the LHC, some of the physical laws that govern their hypothetical creation would cause them to decay almost immediately. However, the report goes further in exploring the hypothetical dangers of mini-black holes by considering an unphysical scenario with a stable mini-black hole. The LSAG report states:

> One might nevertheless wonder what would happen if a stable microscopic black hole could be produced at the LHC. However, we reiterate that this would require a violation of some of the basic principles of quantum mechanics – which is a cornerstone of the laws of Nature – in order for the black hole decay rate to be suppressed relative to its production rate, and/or

> of general relativity – in order to suppress Hawking radiation.

Attach. 15 at 8 (citation omitted). Even in the above unphysical case, after presenting arguments based on astrophysical observations, the report concludes that:

> To conclude: in addition to the very general reasoning excluding the possibility that stable black holes exist, and in particular that they could only be neutral, we therefore have very robust empirical evidence either disproving their existence, or excluding any consequence of it.

Id. at 9.

Monopoles

42. The 2003 LHC Safety Report also addressed the concern with the hypothetical production of magnetic monopoles. Magnetic monopoles, in certain speculative models, if produced, could catalyze a proton to decay. The report calculated that a hypothetical monopole would destroy no more than 10^{18} nucleons, which is "negligibly small" and an insignificant amount of matter. Attach. 14 at 13. The 2003 LHC Safety Report therefore concluded that magnetic monopoles "do not present any conceivable threat." Id.

43. The 2008 LSAG Report confirms the conclusion of the 2003 LHC Safety Report that the possible production of hypothetical monopoles at the LHC would be completely harmless. The 2008 LSAG Report points out that the speculative theories that predict monopoles that catalyze proton decay require

monopole masses so large that there is no chance that they will ever be produced at the LHC. Even if one assumes that the hypothetical magnetic monopoles will be produced at the LHC, the report points out that they would be also produced by very energetic cosmic rays on the Earth. Because magnetic monopoles have a large magnetic charge, any monopoles produced by cosmic rays would come to a stop while traversing the earth. Therefore, the 2008 LSAG Report concludes:

> The continued existences of the Earth and other astronomical bodies such as the Sun mean that any magnetic monopoles produced by high-energy cosmic rays must be harmless. Likewise, if any monopoles are produced at the LHC, they will be harmless.

Attach. 15 at 6.

Summary of Scientific Conclusions

44. The conclusions of the 1999 RHIC Safety Report have been confirmed by the fact that the RHIC has been operating since 2000 without any "catastrophe scenarios" occurring. In addition, neither the RHIC experiments at BNL, nor the experiments on the Tevatron facility at DOE's Fermilab near Chicago, Illinois, have detected any hints of the existence of strangelets, micro black holes, or magnetic monopoles.

45. I and other scientists within DOE's Office of High Energy Physics have reviewed the analysis of the 1999 RHIC Safety Report, and I am authorized to state that our Office agrees with the report's conclusions. Since release of the

1999 RHIC Safety Report, our office is not aware of a single instance where the report's conclusions have been either contested or rebutted in any particle physics peer-reviewed publication or scholarly forum.

46. I and other scientists within DOE's Office of High Energy Physics have also reviewed the analysis of the 2003 LHC Safety Report, and I am authorized to state that our office agrees with the Report's conclusions. Since release of the 2003 LHC Safety Report, our Office is not aware of a single instance where the report's conclusions have been either contested or rebutted in any particle physics peer-reviewed publication or scholarly forum.

47. I and other scientists within DOE's Office of High Energy Physics have also reviewed the analysis of the 2008 LSAG Report, and of the SPC Report. I am authorized to state that our office agrees with the conclusions of those reports.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 23rd day of June 2008.

Bruce P. Strauss

Bruce P. Strauss

TABLE OF ATTACHMENTS

Number	*Description*
1	Dr. Bruce Strauss, *Curriculum vitae.*
2	Dr. Bruce Strauss, *List of Publications.*
3	MOU between DOE and NSF concerning U.S. participation in the LHC (Dec. 13, 1999)
4	International Co-Operation Agreement between CERN, DOE, and the National Science Foundation of the United States of America Concerning Scientific and Technical Co-operation on Large Hadron Collider Activities (Dec. 8, 1997) ("International Co-Operation Agreement")
5	Comm. on Elementary Particle Physics in the 21st Century, National Research Council, *Revealing the Hidden Nature of Space and Time: Charting the Course for Elementary Particle Physics*, 3 (2006)
6	DOE 2006 Strategic Plan at 18
7	http://public.web.cern.ch/Public/en/About/Global-en.html (last visited June 16, 2008)
8	U.S. LHC Construction Project Execution Plan (Revision 0. Dec. 1, 1998) (without appendices)
9	"U.S. LHC Accelerator and Detectors Funding Profile," in DOE FY 2009 Congressional Budget Request (February 2008) at 245
10	"LHC: The Guide," CERN-2008-001-Eng (March 4, 2008)
11	U.S. LHC Construction Project Execution Plan (Revision 1. Oct. 29, 2002), Appendix 2.B (U.S. ATLAS) and Appendix 2.C (U.S. CMS) (excerpted)
12	"General Conditions Applicable To Experiments At CERN" (February 20, 2008)

13 W. Busza *et al.*, "Review of Speculative 'Disaster Scenarios' at RHIC" (September 28, 1999) ("1999 RHIC Safety Report")

14 J.-P. Blaizot *et al.*, "Study of Potentially Dangerous Events During Heavy-Ion Collisions at the LHC: Report of the LHC Safety Study Group" (February 28, 2003) ("2003 LHC Safety Report")

15 J. Ellis et al., "Review of the Safety of the LHC Collisions" (June 20, 2008) ("2008 LSAG Report")

16 CERN Scientific Policy Committee, "SPC Report on LSAG Documents" (June 20, 2008) ("SPC Report")

17 http://press.web.cern.ch/press/PressReleases/Releases2008/PR05.08E.html (last visited June 20, 2008)

CERTIFICATE OF SERVICE

I hereby certify that, on June 24, 2008, by the methods of service noted below, a true and correct copy of the foregoing FEDERAL DEFENDANTS' DECLARATION OF BRUCE STRAUSS and attachments thereto were served on the following at their last known addresses:

Served by first-class United States mail, postage prepaid:

LUIS SANCHO
P.O. Box 411
Honomu, Hawaii 96728

WALTER L. WAGNER
P.O. Box 881
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Dated: June 24, 2008

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